WHAT IS CLAIMED IS:

1. A wireless base station transmitter comprising a digital front end and an analog back end, said digital end and analog end connected through at least one digital-to-analog converter having a full scale range, said base station transmitter comprising:

    at least one multiplier in the digital stream before said at least one digital-to-analog converter for introducing digital gain to a signal by scaling the digital representation of said signal to the full scale range of said at least one digital-to-analog converter.

2. The wireless base station transmitter of claim 1, further comprising at least one peak-to-rms ratio reducer before said at least one digital-to-analog converter, for constraining the signal peaks of said signal with digital gain, to a level that does not exceed the maximum power tolerances of said base station transmitter.

3. The wireless base station transmitter of claim 1 wherein said digital representation of said signal to be transmitted comprises I and Q components and said I component is input into a first digital-to-analog converter and said Q component is input into a second digital-to-analog converter, wherein said at least one multiplier comprises:

    at least one first multiplier in the digital stream before said first digital-to-analog converter for introducing digital gain to said I component by scaling the digital representation of said I component to the full capacity of said first digital-to-analog converter; and

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9   at least one second multiplier in the digital stream before said second digital-to-

10   analog converter for introducing digital gain to said Q component by scaling the digital

11   representation of said Q component to the full capacity of said second digital-to-analog

12   converter.

1   4. The wireless base station transmitter of claim 3, further comprising:

2   at least one first peak-to-rms ratio reducer for constraining the signal peaks of said I

3 component of said signal with said digital gain, to a level that does not exceed the maximum

4 power tolerances of said base station transmitter; and

5   at least one second peak-to-rms ratio reducer for constraining the signal peaks of said Q

6 component of said signal with said digital gain, to a level that does not exceed the maximum

7 power tolerances of said base station transmitter.

1   5. The wireless base station transmitter of claim 1 wherein said transmitter is a Code Division

2 Multiple Access transmitter.

1   6. A method for transmitting a radio frequency signal from a base station transmitter comprising

2 a digital end and an analog end, wherein said signal is to be amplified prior to transmission, said

3 method comprising the steps of:

4   applying digital gain to the radio frequency signal at said digital end of said base

5   station transmitter;

6   converting said radio frequency signal with said digital gain, into analog form;

7   and

8   transmitting said analog radio frequency signal.

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1   7. The method of claim 6 wherein said radio frequency signal comprises an I component and a

2   Q component and where said step of applying digital gain is separately applied to said I and Q

3   components.

1   8. The method of claim 6 further comprising the step of constraining said signal with said

2   digital gain such that peak values of said signal with said digital gain are limited by the

3   maximum power tolerance of said base station transmitter.

1   9. The method of claim 8 wherein said radio frequency signal comprises an I component and a

2   Q component and wherein said constraining step is separately applied to said I and Q

3   components.

1   10. The method of claim 6 wherein said converting step is performed with at least one digital-to

2   analog converter having x bit input lines and wherein said step of applying digital gain further

3   comprises the step of multiplying said digital representation of said voltage of said radio

4   frequency signal by a factor equal to $(2^{x-1} - 1)/$ (the peak voltage value of said radio frequency

5   signal).

1   11.   A method for computing an analog gain reduction in a base station in which digital gain

2   is applied to a signal to be transmitted, said method comprising the steps of:

3   receiving specific equipment settings of at least one or more components of said base

4   station;

5   using at least one of said specific settings, computing a maximum expected value of said

6   signal;

7   using said computed maximum expected values, computing a desired digital gain

8   "e"; and

9   using said computed desired digital gain, computing a closest analog gain reduction

10   setting "f".

1   12.   The method of claim 11 wherein said signal comprises as I component and a Q

2   component and wherein said step of computing a maximum expected value of said signal further

3   comprises computing a maximum expected value of each of said I and Q components of said

4   signal.

1   13.   The method of claim 12 wherein said specific equipment settings comprise one or more

2   of the following:

3   a signal processing gain "c" for root mean square counts to digital gain units

4   appropriate for one or more channel elements used by said base station, each of said

5   channel elements to support at least one call;

6   a maximum allowed ten-minute average power for said signal, "x";

7   a maximum allowed two-second average power overshoot for said signal, "y";

8   a constraining peak-to-average ratio set-point for said base station "a";

9   an analog gain reduction designed in a radio component of said base station "r";

10   the bit size capacity "b" of one or more digital–to-analog converters of said base

11   station;

12   an analog gain reduction for adjusting the base station coverage footprint; and

13   an allowed analog-to-gain reduction increment.

1   14.   The method of claim 13 wherein each of said maximum expected values are computed as

2   $c * ((10^{y/10})*(x))^{1/2} / 2^{1/2}$, where y is measured in dB and x is measured in digital gain units

3   squared.

1   15.   The method of claim 14 wherein said I and Q components of said signal are computed as

2   having said maximum expected value.

1   16.   The method of claim 13 wherein said desired digital gain for each of said I and Q

2   components are calculated as $(2^{b-1} - 1)/(c*10^{a/20})$, wherein a is measured in dB.

1   17.   The method of claim 16 wherein b equals 12.

1   18.   The method of claim 13 further comprising the step of determining the current analog

2   gain reduction setting of said base station, said current analog gain reduction setting of said base

3   station being designated as "d", wherein said closest analog gain reduction setting is computed as

4    $g = -r + d + 20*\log_{10}$ "e" rounded off to the nearest allowed analog gain reduction increment.

1   19.   The method of claim 12 further comprising the step of computing the actual digital gain

2   for each I and Q components of said signal, using said closest analog gain reduction setting.

1   20.   The method of claim 19 wherein said actual digital gain is computed as $10^{f/20}$, where "f"

2   is measured in dB.